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F.W.BELL

UM-1000

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INSTRUCTION MANUAL

UTILITY MASTER CURRENT PROBE MODEL UM-1000

F.W. BELL

360674

SPECIFICATIONS

Unless otherwise stated, all ratings are valid from -15°C to 35°C at 0% to 90% relative humidity (R.H.), and from 35°C to 50°C at 0% to 70% R.H.

ELECTRICAL PARAMETERS

CURRENT RANGE: 0-1000 A ac and dc
100% Overrange

ACCURACY, dc★: 1-700 A ±1.5% of reading, ±2 A
701-1200 A ±2.5% of reading, ±2 A
1201-1500 A ±7.5% of reading, ±2 A
1501-2000 A ±20% of reading, ±2 A

ac: 1-700 A ±2.5% of reading, ±1.5 A
701-1000 A ±4.5% of reading, ±1.5 A
1001-1500 A ±15.0% of reading, ±1.5 A
1501-2000 A ±30.0% of reading, ±1.5 A

OUTPUT: 1 mV/A

FREQUENCY: dc—500 Hz

BATTERY: 9 V Alkaline

OPERATING TEMPERATURE RANGE: 0°C to 50°C @ 0% to 70% R.H.

APERTURE SIZE: 2⅜"

OUTPUT LEADS: Hard-wired and terminated with banana plugs

NOISE: 0.3 mV rms

RECOMMENDED LOAD: >5 kΩ

WITHSTAND CAPABILITY: 660 V rms, maximum working voltage

BATTERY TEST: LED indicates POWER-ON. When the LED extinguishes, it indicates that the battery needs replacement

CORE HEATING LIMITATIONS: Prolonged (time exceeding 5 minutes) operation above 120 A•kHz can cause damage

INFLUENCES ON ACCURACY: Conductor off-center: <1.5% change with 0.63 inches (16 mm) or larger diameter cable.

Adjacent conductor current: <0.015 A/A

Non-sinusoidal ac Waveforms: Rated accuracy for crest factor <3.5
(**NOTE:** Waveform may be altered by the attenuation of harmonics)

Temperature coefficient is 0.05 x accuracy/°C (-15°C to 18°C, 28°C to 50°C)

DECEMBER, 1987 Litho in USA UN-01-176

LONG-TERM STABILITY: ±0.5%/1000 hours (estimated)

VOLTAGE WITHSTAND★★: 4,640 V, 60 Hz between core and probe output for one minute
(Test requirement for 660 working volts rms)

LEAKAGE: 0.5 mA maximum with 660 V, 60 Hz between core and probe output for one minute

BATTERY CONSUMPTION: 5 mA nominal (100 hours typical battery life)

STORAGE TEMPERATURE: -40°C to 60°C

MECHANICAL PARAMETERS

OUTPUT CONNECTION: 1.5 meter black cable (SPT-1 or equivalent) terminated with two color-coded banana plugs capable of reaching 6 inches apart.
Plugs are safety-designed

CASE MATERIAL: Black flame-retardant ABS (KJB)

WEIGHT: 1 lb. 13 oz. (822 grams) nominal

★Conductor centered, output terminated into 100 kΩ minimum load resistance and 100 pF maximum capacity, ac input is sine wave, 18°C to 28°C.

★★Test done per IEC 348 (conditioned at 40°C, 95% R.H. for 48 hours, tested between 15°C and 35°C, <80% R.H.)

FEATURES

- Measures dc and ac current
- Clamps around conductors up to 2⅜" diameter
- Output useable with oscilloscope, DVM, and Recorder
- Bi-directional measurement capability
- Clamp-on current input
- Plug-in voltage input
- Easy, safe, one-hand operation
- Low battery drain
- Low battery indicators
- Portable
- Tough, durable ABS plastic housing

APPLICATIONS

- Measure ground currents dc and ac
- Measure power supply ripple
- Measure current distribution in multiple mesh systems
- Measure current balance (two wires) dc or ac
- Measure starting currents without introducing impedance (imparts negligible inductance in the μH range)
- Measure capacitor leakage
- Measure transformer currents
- Measure battery currents (charging and discharging)
- Display current transients to limit of frequency response
- Measure current distribution and perform ripple tests in plating operations
- Read currents in HV conductors through non-magnetic insulation
- Appliance testing
- Plant maintenance and inspection
- Electric utility testing

SIMPLIFIED OPERATING INSTRUCTIONS

1. Install 9-volt battery in battery compartment.
2. Connect appropriate readout device to the output plugs.
3. Zero the probe by using the zero knob on the top of the probe. Be sure to use proper zeroing techniques. (See page 8, paragraph 3.)
4. CURRENT MEASUREMENTS: Clamp the probe around the conductor you intend to measure. The voltage seen on the indicating device hooked to the output of the UM-1000 probe is calibrated for 1 millivolt per ampere.

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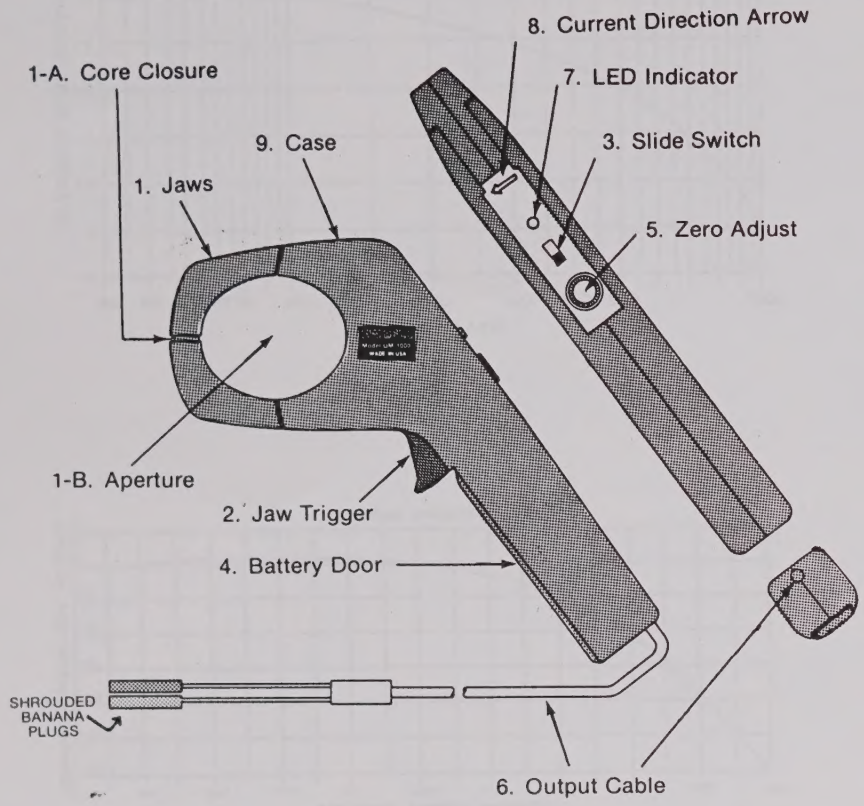
FUNCTIONAL DESCRIPTION

The Model UM-1000 Utility Master is designed to measure ac and dc current. Measurement of current is obtained via dual Hall effect devices mounted in the movable jaws. An output signal is provided on a pair of shrouded banana plugs designed to interface with a voltmeter, multimeter, oscilloscope or recording instruments.



PHYSICAL DESCRIPTION

1. JAWS: Open to accept conductors up to 2⅛" diameter. Insulated, except at core closure (1-A.).

CAUTION: DO NOT USE ON BARE CONDUCTORS OR AT VOLTAGES ABOVE 660 Vac.

NOTE: Inspect core closure area frequently for foreign material. Avoid snapping the jaws as this can damage the core and/or alter the zero set. Centering of conductors smaller than 2⅜" diameter within the aperture (1-B.) is desirable, but not critical within specified accuracy limits.

2. JAW TRIGGER: Designed for easy, one-hand opening of jaws. Positioned for maximum protection from circuit voltages.

3. SLIDE SWITCH: Down = "OFF". Up for current measurements.

4. BATTERY COMPARTMENT: Accessed by sliding the battery door back. Battery snap will accept a 9-volt battery, alkaline or mercury.

NOTE: Support the battery snap when removing to prevent unnecessary stress on the flexible leads to the unit.

5. ZERO ADJUST: Used to zero the dc offsets of the probe before taking reading.

6. OUTPUT CABLE: Five-foot cable (SPT-1 or equivalent) terminated in two color-coded, safety-designed banana plugs capable of reaching 6" apart.

7. LED INDICATOR: When the battery voltage is below an acceptable level, the LED will turn off.

8. CURRENT-DIRECTION ARROW: A positive readout is obtained when current is flowing in the direction of arrow and correct voltage input lead polarity is observed. (For further description, see page 5.)

9. CASE: High-Impact, high-dielectric ABS precision-molded plastic.

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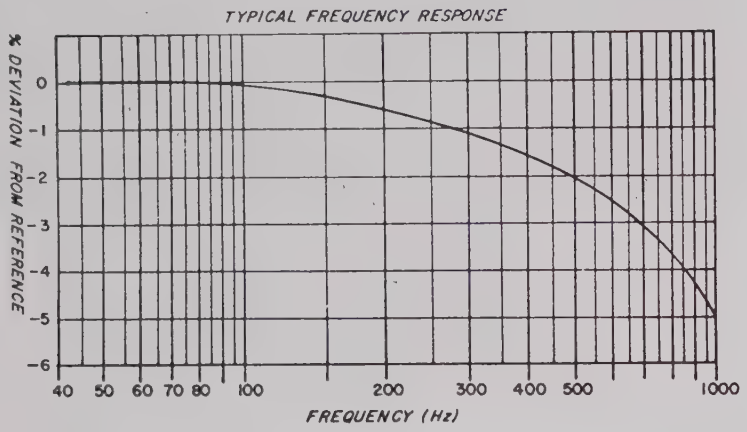
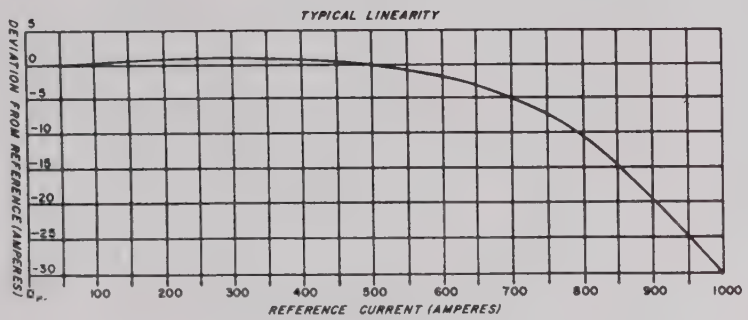
PERFORMANCE CURVES FOR THE UM-1000 IN CURRENT MODE





OPERATION PROCEDURE

1. BATTERY INSTALLATION: Put the slide switch to "OFF", slide battery door back, find the battery snap and install a 9-volt battery (Eveready, Alkaline No. 522, NEDA 1640A, or equivalent). Slide battery door to the closed position.

> **NOTE: Support the battery snap when removing to prevent unnecessary stress on the flexible leads. Observe polarity when replacing battery.**

2. CONNECTION OF READOUT: Connect UM-1000 to an appropriate indicating instrument, observing the polarity indicated by the color-coded plugs. (Red = signal; Black = common).

3. ZEROING: Even before taking a reading, there may be small dc voltage on the output. This is due to amplifier offsets and influence of stray fields from adjacent conductors, and/or from large ferrous objects, the field from the conductor to be measured, the Earth's own magnetic field, and temperature influences.

These influences must be zeroed out to obtain the most accurate reading. Good measurement practice, as outlined below, will minimize any variables from these influences after zeroing.

> **CAUTION: DO NOT USE WITH VOLTAGES EXCEEDING 660 Vac.**

Select a point along the conductor to be measured where the influence of stray fields should be at a minimum. To zero the probe, hold the UM-1000 at right angles to the conductor and about two to four inches out from selected measurement point. The effect of a stray field should be minimal at this location.

To zero the UM-1000, adjust thumb knob to zero the dc output voltage, which may be either positive or negative.

4. CURRENT (AMPS) MEASUREMENT:

A. Connect the output leads to a voltmeter, multimeter, oscilloscope or recording instrument.

B. Zero the UM-1000 as described.

C. The voltage seen at the output cable is an accurate analog signal proportional to the ac, dc, or composite (ac-on-dc) current through the conductor.

D. The voltage output sensitivity is 1 mV per ampere of conductor current.

> **CAUTION: DO NOT CLAMP ONTO BARE CONDUCTORS, OR CONDUCTORS HAVING VOLTAGES HIGHER THAN 660 Vac.**

MEASUREMENT NOTES

1. There can be a few millivolts of thermal drift during the first 60 to 120 seconds of warm-up. For maximum accuracy, a warm-up of 60 seconds before zeroing will eliminate 90-95% of the drift.

2. Where possible, when taking low-level measurements, looping a number of turns of the current-carrying conductor around the bottom jaw will multiply the sensitivity of the readings. The reading on the meter must be divided by the total number of turns through the aperture.

3. Keep core closure area clean of foreign materials.

4. Make sure core closes completely around conductors.

5. For maximum accuracy, rezero after every reading. This is especially important during dc measurements. When the UM-1000 is exposed to a relatively high current, it is possible to create a magnetic offset which can be zeroed out.

SAFETY HINTS

1. Observe all maximum circuit voltage cautions.
2. The aperture is insulated except at the core closure. Withstand capability from core to voltage leads is safe for voltages specified. Do not permit core to come in contact with uninsulated conductors.
3. Inspect voltage input leads frequently for cracks, burns, etc. Do not use if leads become damaged.
4. Prolonged operation above 120 A•kHz can cause permanent damage, due to heating effects. Do not use probe under conditions where the current frequency product is higher than 120 A•kHz.

WARRANTY

F.W. BELL, INC. warrants each instrument of its manufacture to be free from defects in material and workmanship. Our obligation under this warranty is limited to servicing or adjusting free of charge any Utility Master Probes returned to our factory for that purpose. This warranty covers Utility Master Probes which, within 1 year after delivery to the original purchaser, shall be returned with transportation charges prepaid by the original purchaser, and which upon examination shall disclose to our satisfaction to be defective. If it is determined that the defect has been caused by misuse or abnormal conditions of operation, repairs will be billed at cost after submitting an estimate to the purchaser.

F.W. BELL, INC. reserves the right to make changes in design at any time without incurring any obligations to install same on units previously purchased.

This warranty is expressly in lieu of all other obligations or liabilities on the part of F.W. BELL, INC., and F.W. BELL, INC. neither assumes nor authorizes any other person to assume for them any other liability in connection with the sales of F.W. BELL, INC. Utility Master Probes.

DAMAGE IN SHIPMENT

The instrument should be examined and tested as soon as it is received. If it does not operate properly, or is damaged in any way, immediately file a claim with the carrier. The claim agent will provide report forms. A copy of the completed form should be forwarded to us. We will then make necessary arrangements for repair or replacement.

SHIPPING INSTRUCTIONS

Use the original shipping carton and inserts, if possible, or pack the instrument in a sturdy container and surround the entire instrument with two or three inches of shock-absorbing material.

Ship to:
F.W. BELL, INC.
Repair Department
6132 Hanging Moss Road
Orlando, FL 32807
Phone: 305-678-6900
TWX: 810-853-3115
FAX: 305-677-5765

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